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Science Perceptions of Prospective Class Teachers

Şafak ULUÇINAR SAĞIR
Faculty of Education, Amasya University, 05100, Amasya, Turkey

Abstract
The perceptions of class teachers, who will deliver science education at the elementary school, of information and science are significant as these affect the quality of education received by children. The aim of this research is to determine perceptions of prospective class teachers of science. The sample group of the research consists of 120 prospective class teachers. Quantitative research method is employed, word association test is used in the research for data collecting. Findings are presented with conceptual networks and frequency tables. It has been determined that prospective teachers can make associations among the concepts of physical science, science, technology, experiment and scientific method whereas they cannot associate science education with science to an adequate level, and they have a part of the elements regarding nature of science. Some recommendations are given based on the research results.
Keywords: science education, perception of science, teacher education, prospective teacher.

1. Introduction

Improvement in the understanding of information and science of individuals has become mandatory in respect to processes of access to and usage of rapidly increasing information. Modifications have been made in the structure of science and technology in educational system, and arrangements have been made in curricula. The purposes of science education have been rearranged in the elementary school curricula at our country. These purposes include usage of scientific information, scientific processes and other skills in the solution of everyday life problems, understanding the processes of information and how it is used in new researches, adopting scientific research approach and developing scientific thinking habits (Ministry of National Education, 2013). These purposes clearly reveal to which extent scientific literacy is important.

Concepts about science and information, and education of these can be gathered under nature of science theme. A one-size-fits-all definition of science cannot be possibly made. The definitions in general state that science is overall information, depends on research, examination and efforts to know the universe and to find the order of nature, depends on reason and logic, and is a regular and reliable accumulation of information. Çepni (2005) defines science as *"the efforts to accurately think, to research the truth and information, the process of obtaining systematic information and arranging it through scientific methods, and the efforts to understand and identify the universe."* Yıldırım (2004) defines science as a strong method of thinking, and a formal body of information. Einstein states that science is the effort to achieve a harmonization between sensory data and logical thinking while Russel expresses that it is the effort to reach phenomena and to deduce laws from phenomena by means of observation and observation-based reasoning. Yıldırım (2004) brings together all definitions by defining it as the method of finding and verifying hypotheses that explain phone Mona by means of controlled observation and logical thinking. Bell (2008) mentions that science has three dimensions. These are the overall information consisting of phenomena, concepts, laws and theories; processes and methods such as observation, measurement, deduction, estimation, classification, hypothesis development, experimenting, analyzing, etc.; and a way of information that is provable, changeable and is influenced by creativity.

Similar to the ambiguities in the definition of science, information also proves quite difficult to be defined. The branch of philosophy which researches information and information-related problem is epistemology. Information is defined as the overall phenomena, truth and principles to be reached by human mind; and the truth obtained through learning, research or observation (TDK,1988). Information classifications may vary greatly including daily, religious, technical, artistic, scientific and philosophical information. Scientific information, which is the area of interest of science, is a type of information which is objective, provable, universal, consistent, and systematic, based on experience and accumulated knowledge of humanity, and advances on improvement (Tunalı, 2010). Scientific information is not monopolized by a single society and is based on experiment and observation. Explanations, inventions, etc. which are involved with science are produced with the influence of creativity and imagination of humanity. Scientific method is employed to describe and explain phenomena. Scientific method is an actionable and intellectual process which covers these explanations and descriptions of scientists. While descriptions are based on experiment and observation, explanation corresponds to reaching theoretical generalization (Yıldırım, 2004). Scientists are individuals who question what is existent and imagine and work on what should be. Scientists have traits such as curiosity, modesty, being undaunted by failure, open-mindedness and righteousness (Oğuzkan, 1984, 95).These traits should be emphasized from an early age in order to develop the understanding of scientific information in students (Akerson &Volrich, 2006).

Science, scientific information, scientific method, information generation processes and characteristics of science are examined under the nature of science. While Lederman (2002) defines the nature of science, he suggests sociology or epistemology of science, or the values and beliefs which are inherent to the nature of information as a way to know. The effect of educating scientific information and nature of science on the understanding of students of science concepts is well-known (Ryder, Leach, and Driver 1999).

Studies conducted on opinions of elementary school students and children at early ages on scientists, science and scientific information (Kaya, Afacan, Polat, Urtekin, 2013; Yiğit, Alev, Akşan, Ursavaş, 2010; Ünver, 2010; Nuhoğlu and Afacan, 2007; Güler and Akman, 2006; Barman, Ostlund, Gatto and Halferty,1997;Barman 1997; Newton and Newton, 1992; Chambers, 1983) reveal that these concepts are not sufficiently known and explained. One of the major reasons for this situation is the fact that opinions of teachers in this regard are inadequate, inconsistent and full of deficiencies (Akerson, Abd-El-Khalick and Lederman, 2000; Macaroğlu, Taşar and Çataloğlu, 1998; Mellado, 1998; Murcia and Shibeci, 1999). The influence of teachers is of great importance for children to develop positive and realistic opinions ın science, scientists and scientific information and methods. Teachers should be able to help students with conceptually understanding nature of science (Lederman, 1992).

Basic education of individuals start at elementary school. Science lesson is included starting from 3rd grade in the revised science curriculum of elementary schools in our country. Science education is an easy and concrete education that should be delivered through suitable methods and techniques considering teaching the art of thinking; teaching concepts based on experiences; interests and needs, development level and wishes of the child; and environmental opportunities (Aydoğdu, 1999; Gürdal, 1988). Teachers should be able to integrate information, skills and understanding of how science works into science education. Therefore children can learn subjects such as “how scientific data are collected and analyzed,” “how data are interpreted in a creative manner and know these are used in controlling claims and developing theories”, and “how scientific ideas and models can explain occurrences” (Kerfoot, 2009). Conducted researches indicate that science understanding and opinions on nature of science of teachers are inadequate (Aslan, Yalçın, Taşar, 2009; Abd-El-Khalick & Lederman, 2000; Abd-El Khalic and Boujaude, 1997; Macaroğlu et al., 1998; King, 1991; Gallagher, 1991). As they could not possibly teach what they have not learned themselves, understanding of teachers regarding nature of science should be improved. Furthermore, those who understand nature and components of science also fail in fully reflecting these in classroom setting (Abd-El- Khalick, Bell, & Lederman;1998).The most important reason of these inadequate opinions of teachers can be suggested as the usage of inaccurate opinions in course books and science education, or the lack of required information on this subject to a sufficient level (Aikenhead and Ryan, 1992; Mccomas, 2000).

Learning and teaching concepts about science accurately are important in respect to developing an understanding of nature of science. Concepts that are built on the data obtained from the outer world can be considered as the building blocks of information. Different techniques are employed in the identification of hierarchy among concepts, and of cognitive structure. These include, among others, concept maps, drawings, prediction-observation- explanation, interviews, association diagrams, word association and question generation (White & Gustone,1992). The most important advantage of word association tests is that it is easily prepared and implemented, and it can be performed on several persons at the same time. Stimulating words are presented to the student who is asked to give one-word answers until they run out of any answers to each respective stimulating word in the main section of the method. Revealing the changes in the understanding of an individual is important in word association in terms of examining the understanding quality of persons or groups and links established among concepts. There are various researches that use this method in science and social studies. Examples to word association tests used in science include those by Kempa and Nicholls (1983) for studying cognitive structures and problem-solving skills of students in science; by Cardellini and Bahar (2000) about cognitive structures of chemistry engineering students and by Bahar and Özatlı (2003) about cognitive structures of high school students regarding the basic components of living beings, by Özatlı and Bahar (2010) about their cognitive structures regarding excretory system at biology lesson; by Ercan, Taşdere and Ercan (2010) for studying cognitive structures, concept errors and conceptual changes of 7th grade students about solar system and space. The examples to social studies employing word association tests include studies conducted by Read (1993) and Schmitt (1998) on foreign language teaching; by Taşdere and Göz (2011) on perceptions of prospective teachers of historical concept, by Şimşek (2013) on cognitive structures about geographical information systems; by Deveci, Çengelci Köse and Gürdoğan Bayır (2014) on cognitive structures on social information and social studies concepts.

Teachers should be able to combine science with science education and elaborate their educational practices in-depth to the sub-objectives of science education. In this context, the effect of lessons and science education received by them during university is important. Studies about identification and improvement of nature of science and perception of science have been most predominantly conducted with science teachers and science teacher candidates. Class teachers deliver science lessons at 3rd and 4th grades of elementary school.

The individuals who are to formally deliver science concepts, science, characteristics of scientific information, importance of science, and scientific method are class teachers. There are only a limited number of studies on opinions of class teachers on nature of science (Bang, 2013; Abd-El Khalick & Akerson, 2004; Lunn, 2002; Macaroğlu, Baysal & Şahin, 1999, Macaroğlu et al., 1998). Literature review has revealed only a few studies which probe the association of science and science education. It is believed that how prospective class teachers associate perceptions of concepts about science and science education with the concepts will reflect the science education that will be delivered by them. The aim of this research is to determine concept association perception levels of prospective class teachers of science- related concepts.

2. Methodology

2.1. Research Model

Survey model as a descriptive approach has been employed as the method of this research that examined the cognitive structures of prospective class teachers about science. Descriptive approaches are researches that are conducted in order to determine the existing situation. Survey is collecting information in order to define the nature of existing conditions in a given time, and determining or comparing the relations between certain situations (Cohen, Manion & Morrison, 2011). The perceptions of prospective teachers of science and nature of science are attempted to be identified through word association test in this research.

2.2. Research Sampling

Class Teaching students attending to X University in 2013-2014 academic year constitute the population. The sample has been determined through purposive sampling. Class Teaching curriculum contains General Biology and General Chemistry at the first grade, General Physics, Environmental Education, Science and Technology Laboratory Practices I-II and Scientific Research Methods at the second grade, and Science and Technology Teaching I-II at third grade. Subjects and concepts about scientific method, science, physics, chemistry, biology and scientific research are taught at these lessons. Prospective teachers complete all of these lessons at the end of sixth semester of education. Therefore, students who attend to third grade spring semester have been selected as the sample in line with the aim of this research. 120 persons participated in the research.

2.3. Data Collection

Data has been collected by performing a word association test to teacher candidates at the last week of spring semester at the third grade. Two science teaching experts determined the concepts “physical science, science, science education, scientist, scientific information, experiment, research, scientific method” in word association test. Eight pages including one concept per each page were prepared, and respective concept was written for ten times one under the other and was given students with a space below for students to write their sentences. The purpose of word association test was explained to prospective teachers before the practice. The reason for writing the key concept for ten times one under the other is preventing the risk of chain answers; if students does not return to key concept at each time they write a concept, they may drift away from the concept and write the words associated with the concept written as an answer, which, in turn, may prevent the test from achieving its objective. Therefore, it was explained that 10 words were given and how they were supposed to answer. 30 seconds of time was allowed to students who were asked to write down the words they associate with the key concept; and papers were collected at the end of this duration. According to the researches in the literature, 30 seconds of time is deemed sufficient for university students to answer word association test (Bahar & Özatlı; 2003). Other concepts were given in the same manner with the given order, and prospective teacher were asked to answer them.

2.4. Data Analysis

Frequency table and cut-off point technique were used to analyze the word association test performed on prospective teachers. At first, frequency tables which indicated how many times the answers to each keyword were repeated were prepared. The quantity and quality of words given by students as answers to key concepts give information about the concepts associated with the key concept in mind, and the level of understanding (Bahar, Nartgün, Durmuş & Bıçak, 2006). Conceptual networks were created based on the frequency table. Bahar, Johnstone and Suctliffe (1999) used cut-off point technique while creating conceptual networks. In this technique, a given level below than the maximum number of response words assigned for any key concept in a word association test is used as the cut-off point, and words which remain above this point are written in the first section on conceptual network. Then, the cut-off point is periodically reduced down and this process is continued until all key words appear on the conceptual network.

3. Findings

Upon reviewing the frequency of answers given to key words, a total number of 296 different words for science,

175 different words for physical science, 216 different words for science education, 128 different words for scientist, 203 different words for scientific information, 204 different words for experiment, 174 different words for research, and 176 different words for scientific method were found. The frequency table for the answers assigned to each concept is given in Appendix 1.

The most repeated words for the concept science are research (f=30), scientist (f=33), experiment (f=31), objective (f=32), and technology (f=40). Besides, 280 different words which have respective frequencies below 15 were also written down. Prospective teachers predominantly associated science with research and technology while they also considered characteristics of science (continuous, advancing, universal, builds on progress, etc.) among the answers.

For the concept of physical science, the words science (f=47), scientist (f=33), biology (f=41), experiment (f=63), nature (f=33), physics (f=42), chemistry (f=41), laboratory (f=34), and technology (f=40) were written down. 161 different words which have respective frequencies below 15 were also written down. In the sample, in addition to positive sciences, subjects and concepts of physical sciences (such as plants, animals, experiment material and environment) were also used for this keyword. Furthermore, science literacy (f=21) was also used as the word associated with physical sciences.

As for science education key word, experiment (f=36), laboratory (f=26), teacher (f=23) and 208 words with a frequency below 15 were given as answers. School, lesson, teaching, physics, chemistry and biology concepts were also abundantly used in relation to science education while the words with high frequency for science education are laboratory and experiment.

While most frequently repeated words for scientist are researcher (f=36), experiment (f=28), intelligent (f=29), hard-working, curious, objective (f=18) and laboratory (f=19); 115 words with a frequency below 15 were also written. The answers given by prospective teachers to this concept such as thinker, glasses, Einstein, creative and knowledgeable reflect the image of scientist in their minds.

As for scientific information, impartial-impartiality (f=43), phenomenal (f=35), objective (f=29), experimental (f=23), provable (f=23) and 197 different words with a frequency below 15 were written down.

As for the concept of experiment, beaker (f=28), physical science (f=20), observation (f=22), laboratory (f=53), material (f=26), microscope (f=20) and 192 words with a frequency below 15 were mentioned.

For research, science (f=22), experiment (f=32), examination (f=40), article (f=31), curiosity (f=36) and 166 words with a frequency below 15 were written down.

For scientific method, research (f=57), experiment (f=26), impartiality (f=22), technical (f=24) and 166 words with a frequency below 15 were given as answers.

The resulting frequency distribution for the associations of key concepts with each other is given in Table 1.

Table 1. Frequency table for associations among key concepts

	Science	Physical Science	Science Education	Scientist	Scientific Knowledge	Experiment	Research	Scientific Method
Science	4	*47*	22	9	5	18	22	14
Physical Science	24	5	3	2	13	24	14	12
Science Education			10		3	10		
Scientist	*33*	33	1	6	5	13	18	14
Scientific Knowledge	5	2	1			18	5	3
Experiment	31	*63*	*36*	*28*	8	3	32	27
Research	30	16	11	8	*15*	19	5	57
Scientific Method	1						1	2

The levels of remembering key words within each other were found to have high frequencies for science-scientist, physical science-science, science-experiment, science education-science, science education-experiment, scientist-experiment, scientific knowledge- research, research-experiment, scientific method-research pairs. It was seen that these corresponding concepts were used in the conceptual networks drawn with a cut-off point identified. Cut-off point conceptual networks are given below.

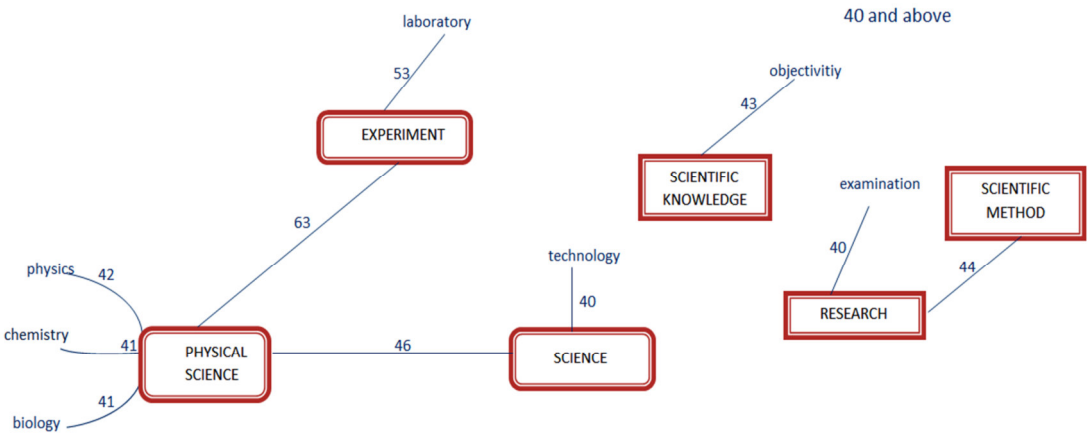

Figure 1.a. Conceptual networks of key words based on cut-of fpoint 40 and above

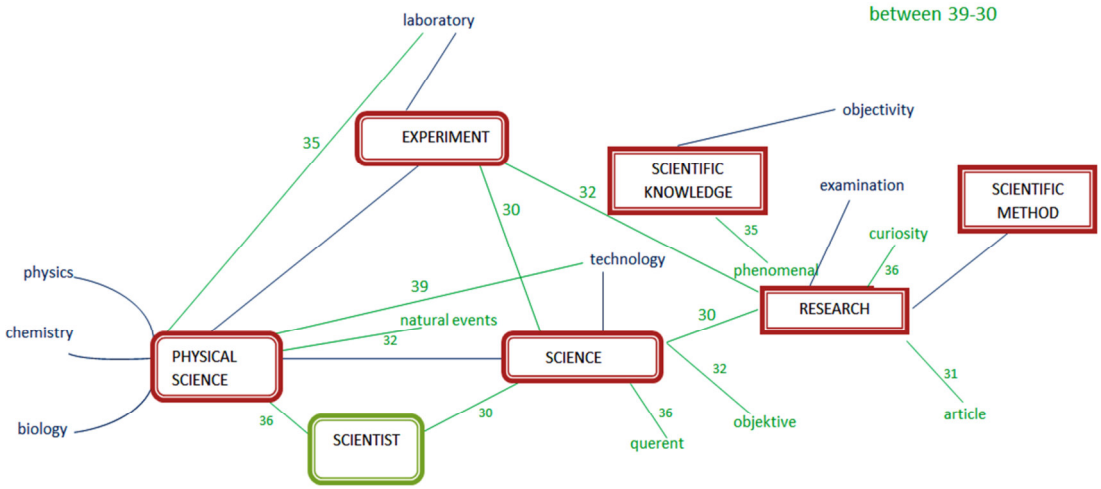

Figure 1.b. Conceptual networks of key words based on cut-off point between 39-30

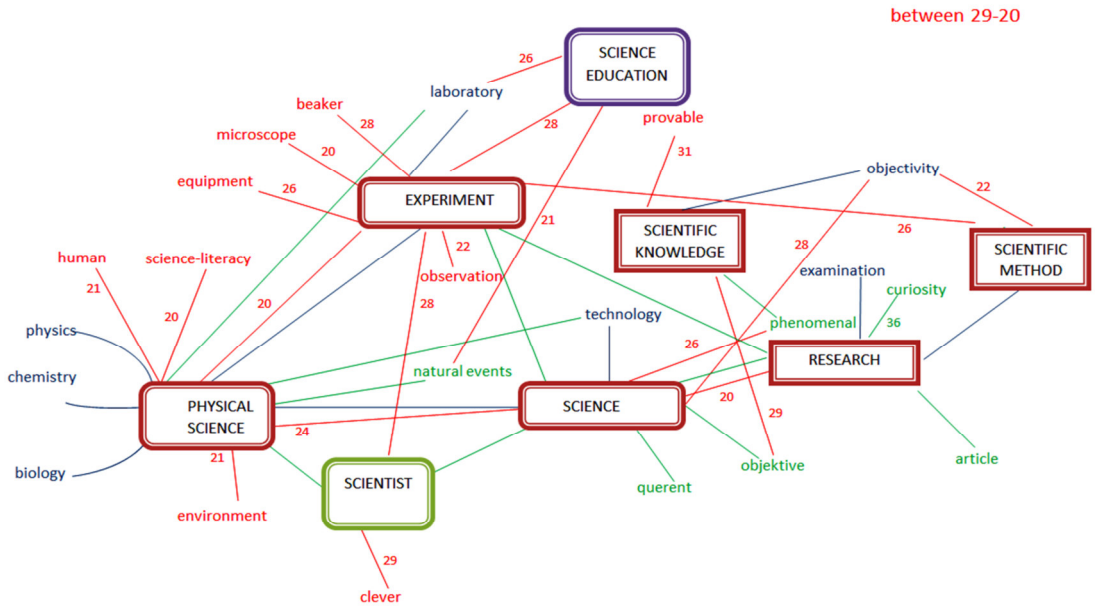

Figure 1.c. Conceptual networks of key words based on cut- off point between 29-20

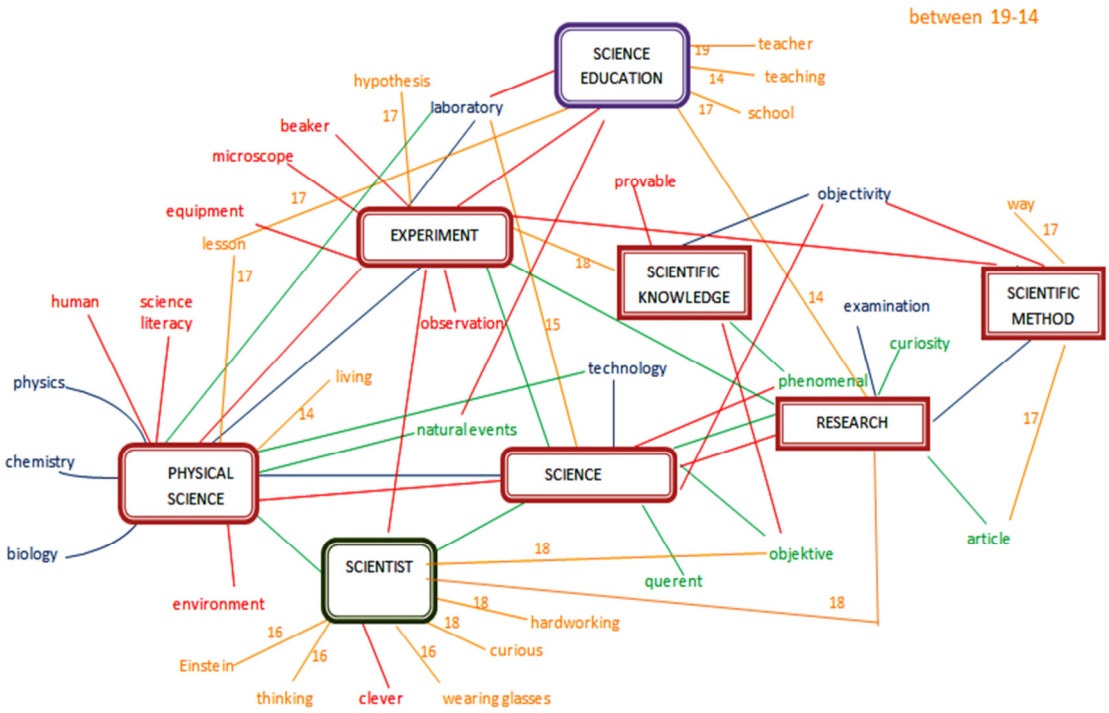

Figure 1.d. Conceptual networks of key words based on cut-off points between 19-14

Cut-off point 40 and higher: Physical science key concept was mostly associated with experiment in addition to others including physics, chemistry, biology and science. Experiment was associated with laboratory while science was associated with technology. Scientific knowledge was associated with impartiality while research was associated with concepts of examination and scientific methods. Frequencies were indicated in the links on the conceptual network. Upon review, it is observed that the association between physical science and experiment was mostly repeated.

Cut-off point between 39-39: The association of scientist key word with physical science and science was observed within this range. The associations between other key concepts were determined as well. Physical science was associated with technology, natural events and laboratory; science was associated with experiment, researcher and objective; research was associated with curiosity, article, experiment and scientific method; scientific knowledge was associated with phenomenal and provable. The association of scientific method with research indicated that key concepts are used within each other.

Cut-off point between 29-20: Science education was observed as a key word within this range. Science literacy, human and environment within physical science concept; physical science, phenomenal, impartiality within science; science within research; science, material, microscope, beaker, science education, scientific method, scientist and observation within experiment; nature/occurrences and laboratory within science education; provable, objective within scientific knowledge; impartiality within scientific method and intelligent within scientist were revealed. It was observed that the associations among key concepts increased.

Cut-off point between 19-14: The associations lesson and alive for physical science concept; laboratory for science concept; science education and scientist for research; way and article for scientific method; teacher, education, school and lesson for science education; hypothesis for experiment; Einstein, thinker, glasses, curious and hard-working for scientist concept were observed.

Key concepts were reviewed in the context of the lessons received by prospective teachers. Frequency distribution in respect to lesson contents of scientific research methods is given in Table 2.

Table 2. Frequency distribution of key words in respect to contents of scientific research methods course

Words	Science	Physical Science	Science Education	Scientist	Scientific Knowledge	Experiment	Research	Scientific Method	Total
Experimental	3	3	10	1	23			14	54
Latitudinal								1	1
Etnographic								7	7
Fenomenographic								1	1
Traditional								1	1
Cross-sectional								1	1
Interview								7	7
Causitive	1				6		2		9
Quantitative Data								1	1
Qualitative Research Method							1	1	2
Qualitative Data							3		3
Preliminary Test		1				1	1		3
Case Study							1	10	11
Sample	1							1	2
Screening								3	3
Case study								1	1
Historical					1				1
Final Test		1				1		2	4
Survey							1	12	13
Quasi-Experimental								2	2
Longitudinal								3	3

In association with scientific research methods, “experimental” was the most frequently repeated word (f=54) followed by case study (f=11). Upon reviewing the distribution of key concepts within each other, it is observed that these words are most predominantly used within “scientific method” concept. Theory (36), law (10), method (14), data (13), technical (32), approach (3), phenomenon (12), strategy (16), principle (4), method (7), theorem (8), concept (29), principle (5), hypothesis (57), variable (17), information (74), scientific observation (1), interview (7), survey (4) are other words mentioned in relation to the lesson contents of scientific research methods (total frequency).

Prospective teachers answered scientist and scientific method key words with Einstein (f=16), Newton (4), Edison (f=4); Gagne and Piaget (f=3), Gardner, Bloom, Kant, İbni Sina and Farabi (f=1). It can be suggested that these names belong to scientists who are frequently heard of during lessons, and therefore associated with scientific method.

The answers of prospective teachers to the concept experiment were observed to include frequently used materials at laboratory such as beaker (28), lame-lamella (22), microscope (20), experiment tube (12), tripod (9), amyant wire (7), thermometer (5), flame (4), spirit burner (3), battery (1), cable (1). Doing-living (13), report (10), v diagram (4), result (7), test (6), theory (4), concretization (6), closed end experiment (10) and open end experiment (11), induction (1) deduction (1) were also written under the concept of experiment. Students directly associate the concept with the materials that they actively use at the lesson, the objectives of experiment and experiment types while they do not consider laboratory approaches much.

The words of impartiality, questionability, skepticism, facticity, arising/satisfying curiosity, reasoning, information generation/collection/obtaining, finding, invention, discovery, change/variable, universal, development, observation, cumulative, logical, mathematics, school, continuous, technical, space, creativity and innovation which have a frequency lower than 14 for the concept of science suggest that prospective teachers have an extensive thinking structure about the features of science. Nonetheless, most of these have been used for scientific knowledge concept as well. Technology, life, student, book, concept, human, observation, necessary, science literacy (11), physics, chemistry, biology, environment, information and scientific words were written down under science education.

4. Discussion

Upon reviewing the answers given by prospective class teachers to key concepts of word association test, it is observed that they have made the associations of science, physical science, technology, experiment, scientific

method and research with higher frequencies. Association of science with research, experiment and scientist was revealed thereafter; the associations between science education with experiment and experiment with scientific method were determined with lower frequencies. It can be suggested that prospective teachers fall short in associating science and science education. The main objective of science education is instilling science literacy to all citizens (National Science Teacher Association, 1990; Bybee, 1997; Çepni, 2001). A very scarce number of prospective teachers were able to associate science education with science literacy. Association of science education predominantly with teacher, lesson, school, teaching, experiment and research may stem from the lessons received by the sample and that the sample perceives it as a lesson that they will deliver after becoming class teacher.

The level of association among science, physical science and technology was observed to be high in the answers of prospective teachers. Aslan, Taşar and Yalçın (2009), determined that science and technology teachers use science and technology concepts as a replacement for each other; Kaya (2012) determined that preschool and prospective science teacher include technologic advancement, development of countries and a good life expressions while defining science. The science definitions given by elementary school students also have similar results (Özgelen, 2012). Associations between science and physical science, science with physics, chemistry and biology as made by prospective teachers are consistent with the literature (BouJaoude, & Abd-El Khalick, 1995).

Prospective teachers are of the opinion that scientific information is phenomenal, impartial, provable and experimental; and science is researcher, objective and phenomenal. In the researches about the nature of science, the importance of having an understanding that scientific information is socially structured by scientists and it is based on phenomena, subjective and open to change is emphasized (Köseoğlu, Tümay and Budak, 2008). In the study conducted by Kaya, Afacan, Bolat and Urtekin (2013) on secondary school sixth, seventh and eighth grade students, scientific information and its characteristics were found as based on science, provable; obtained with experiments, researches and studies; phenomenon; developing technology, accepted by everyone and does not change. Taşar (2002) mentionthat the majority of prospective teachers have a positive opinion on understanding, interpreting and learning science. It is known that students from different age groups and even teachers have both insufficient and invalid understandings about the nature of science (Lederman,1992; Duschl, 1990; Abd-El-Khalick & Lederman,2000). The reason for this situation that the existing beliefs of people on nature of science resists against change and improvement (Meichtry, 1992). It is clear that beliefs of students on nature of science will be improved by teachers who achieved in developing accurate opinions. In this context, it is observed that the opinions of prospective class teacher on the characteristics of scientific information are acceptable in regard to nature of science.

One of the objectives of science education in the elementary school science curricula at our country is ensuring that students comprehend characteristics and methods of science, and learn how scientific information is generated, the values that constitute the essence of science, and concepts about the nature of science (Doğan Bora, Arslan, and Çakıroğlu, 2006; MNE, 2013). Students should learn these concepts accurately, have an accurate image about scientists, and understand how scientists work (Kaya, Doğan and Öcal, 2008; MNE, 2013). In this study, prospective teachers described scientists as hard-working, curious, glasses, intelligent, thinker, objective; and associated scientists with the concepts of research, science, physical science and experiment. Şenel and Aslan (2014) stated that prospective preschool teachers observed science as benefit offering, wide-ranged, dynamic, cumulative guide perceived as a source of information; while scientist was observed as the person who researches, questions, offers benefits, generates/discovers information and grants access to information in the metaphor study conducted. In the study of Öcal (2007), students defined scientist as a man with a laboratory apron and glasses who only works and is committed to his job. Prospective teachers mostly defined scientist as a person who conducts dangerous experiments alone at a laboratory (Reap, Cavallo &McWhirter, 1994; cited in Finson, 2002).

Another study conducted on prospective elementary school teachers indicated that prospective teachers had a stereotypical scientist image in their minds (Moseley & Norris, 1999). While students mostly described a scientist as a white male (Finson, 2002), Bodzin and Gehringer (2001) stated that the image of scientist in the minds of students changed positively after their class was visited by scientists. The most frequently mentioned characteristics of scientists by prospective class teachers are that they are curious, researcher, patient, critical, committed, logical and hard-working persons in the study conducted by Çermik (2013). Experiment materials, printed materials, equipment, notes and drawings were mentioned as setting. These researches support the findings of the present study.

Prospective teachers most predominantly wrote the names of Einstein, Newton and Edison for scientist. Çermik (2013) also stated that the first names to come to the minds of teacher prospective were Albert Einstein and Thomas Edison followed by Isaac Newton, İbn-i Sina, Galileo Galilei, Archimedes, Alexander Graham Bell, Aristoteles, Mimar Sinan, Nicola Tesla and Ivan Pavlov in association with scientist. Einstein and Edison are the most favored scientists in different research results as well (Korkmaz & Kavak, 2010; Song & Kim, 1999). The

facts that prospective class teachers frequently hear the names of scientists such as Piaget, Gagne, Gardner and Newton in their branch and education lessons and that they use various scientific explanations made by them have influenced their answers.

Physics, chemistry, biology, environmental education, science and technology laboratory practices and science and technology teaching lessons are included in the curriculum of class teaching at Faculty of Education. Prospective teachers are aimed to acquire knowledge on types of experiments, laboratory approaches, methods-techniques used in science teaching and experiments about science lesson contents with these lessons. The objectives of scientific research methods course include delivering information on scientific knowledge, types of information, research methods, data collection techniques and various practices. Upon reviewing the answers given to word association test, it is observed that prospective teachers better remember the names of tools and equipment actively used at laboratory lessons. Again, the answers given in association with scientific method indicate that prospective teachers are capable of associating the concepts used at the scientific research methods lesson that they receive with science perception. In the researchers conducted with prospective teachers by Akgün and Soylu (2012), and with graduate students by Çetin and Dikici (2014) on the perception on scientific research methods lesson, it is stated that the outcomes of lesson were mostly achieved.

5. Conclusion

The aim of this research is to reveal the cognitive structures and associations of prospective class teachers in respect to science and physical science education. As a conclusion, it was found that prospective teachers are able to make associations among the concepts related to science; however, the associations of concepts about science education are more limited. Prospective teachers think of science together with physical science, technology, research, scientific method, scientist, experiment and various areas of science. This study, which examines cognitive structures, indicate that class prospective teachers perceive various characteristics about science. It was observed that their opinions on scientist, research and scientific method were connected; however, science education was not associated with these concepts much.

Various activities that involve the nature of science should be included in the branch education lessons in order to improve science perception of prospective teachers. Science education should be performed in a manner to improve understanding of science; and educational activities that explain characteristics of scientific information and its relation with physical science and research should be carried out. The process of creating science and scientific knowledge at laboratory lesson should be taught in association with science education. In addition to scientific research methods, science education and science laboratory lessons, various lessons that cover the contents related to the nature of science may be offered as optional lessons in class teaching curriculum Conducting studies on cognitive structure with similar samples by adding different key words may contribute to the literature.

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Ş. Uluçınar Sağır (G'99- M'02- PhD'08): The author was born in Amasya/Turkey in 1978. She graduated from department of Chemistry Education Ondokuz Mayıs University in 1999, her master's degree was completed Institue of Science department of Chemistry at the same university in 2002. Then, she completed Ph.D. Institute of Educational Sciences department of Science education in Gazi University in 2008. The author has been working as a faculty member at Amasya University Faculty of Education since 2009 and has been awarded the title of associate professor of science education in 2013. The authors' research subjects are argumentation, science education, nature of science and teacher education.